

Developing a SPOT CRM Debriefing Tool



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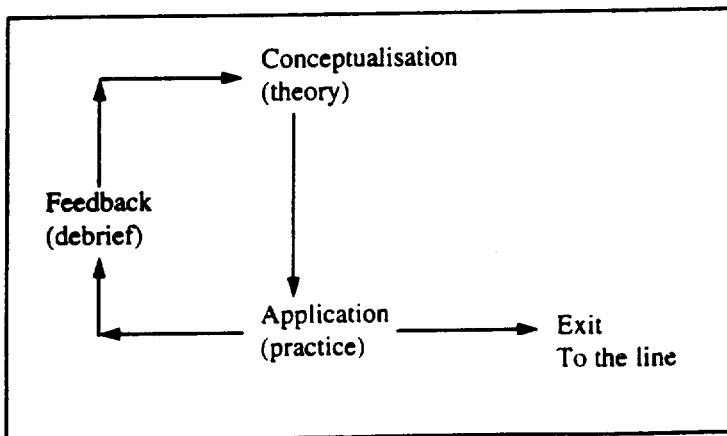
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SLIDE 1: DEVELOPING A SPOT CRM DEBRIEFING TOOL - BACKGROUND TO THE WORK

In a study of CRM LOFT debriefings published in 1997, Dismukes, McDonnell & Jobe reported that debriefings were not being utilized as fully as they could be and that crews may not be getting the full benefit from LOFT that is possible. On the basis of their findings, they suggested a set of general guidelines for debriefings for the industry.

Our work builds on this study to try to provide a specific debriefing tool which provides a focus for the strategies that Dismukes et al suggest.

The Learning Cycle & the SPOT



SLIDE 2: THE LEARNING CYCLE

The importance of debriefing within a training programme is illustrated by the learning cycle proposed by Mayes et al in 1994. Whilst presentation of the theory informs the learner, and practicing gives the learner experience, it is the debrief, or subsequent feedback session which helps the learner to make sense of their actions and to tie 'what they did' to what they were taught. Despite being last, the debrief session is certainly not the least element of the learning cycle! However, it *is* arguably the hardest to complete successfully because the instructor has to make the connection between the theory and practice, and not just general practice but that of the participating crew.

The aim of our debriefing tool was to assist the instructor to make the connections between concrete actions and the principles that the airline wants their crews to work by; to provide a means to bridge theory and action.

Training Focus

- Airline has 6 CRM categories:
 - Planning
 - Decision Making
 - Workload Management
 - Situation Awareness
 - Communication
 - Crew Coordination
- Focus of scenario studied is situation awareness management

Simulation Scenario

3. Fly Direct to Broadway

Pax gets up to go to lavatory
 "Climb and maintain 14,000 feet"
 "Stop your climb at 12,000 feet"
 Altitude capture fails

Broadway
 (BWZ)

1. Preflight

F/O Nav Display Inoperative
 Anti-ice required
 Preflight Checklists

2. Runway 13: Whitestone Climb

Turn right heading 175
 At 2.5 DME, turn left to 040
 Maintain 5,000 feet
 Do not exceed 210 kts

LaGuardia

SLIDE 3 - 5: THE SCENARIO

For the participating airline the principles we were concerned with were their six CRM categories - planning, SA, DM, communication, workload management and coordination. They select one of these categories as a focus each year. In 1997 this was situation awareness and its management.

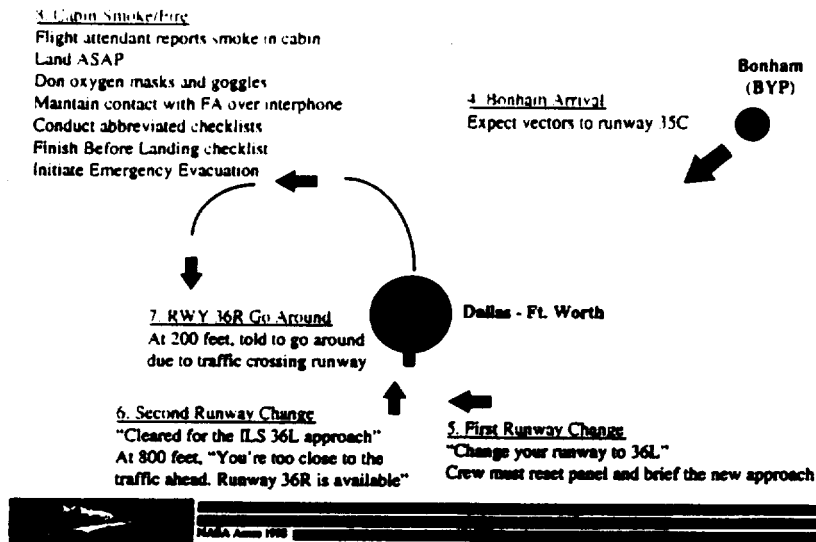
The category is presented in a groundschool session at the beginning of the crews' recurrent training - which is a yearly event.

The rest of the CRM training occurs on the second day of the recurrent in a SPOT session. SPOT is Special Purpose Operational Training where the simulation crews participate in may or may not be a complete trip. In 1997 the trip was a flight from LGA to DFW but the cruise portion was omitted in the interests of time and the simulator repositioned as the flight went into cruise. The SPOT practical is combined with a maneuvers practical and the two sessions are debriefed after.

The scenario involves preparation and departure from LGA - a complicated departure with many restrictions that the crew has to observe, followed by an automation failure where the VNAV capture does not work. The second portion of the scenario involves a 'typical' approach to DFW with two runway changes. It is aborted at the last minute due to traffic on the runway. As the crew goes around the flight attendants report smoke in the cabin and the crew has to bring the airplane in on an emergency landing.

Our aim was to identify important behaviours from an SA perspective within this scenario which the instructors could use as prompts in the debrief for both themselves and to encourage crews to discuss their SA.

Simulation Scenario (cont'd)



SLIDE 6: METHOD

We identified behaviours using a triangulation method of video, interviews and the literature.

We took the studies of SA from the literature, for example Endsley's and Brannick & Princes', and reviewed these in the light of the generic behaviours the airline notes as part of their CRM skills. For example one SA behaviour is:

"recognize when automation is becoming a detriment to SA and use a more appropriate level of automation". We identified instances within the SPOT scenario where we thought these points may apply and therefore the places in the scenario where SA was particularly critical.

Our second method was to interview five instructors in depth about the behaviours they were looking for in the SPOT and why. As part of the interview, we asked instructors to rank the SPOT events in terms of their importance. They rated the departure briefing, altitude capture fail, approaches and dealing with the smoke as the four most important events, and on the basis of this we selected these four events for us to focus our efforts on.

The third method was to analyze the behaviours of crews in video tapes of 11 SPOT sessions. These were regular line crews who were undergoing their recurrent training and agreed for us to analyse the video. We listed all the behaviours we saw on video, and then using our findings from the first two methods, we extracted the relevant behaviours.

Triangulation Method

- Video Tapes
 - 11 samples collected
 - Identified behaviors
 - Sorted behaviors for unusual & important
- Interviews - 5 highly structured, in-depth interviews were conducted
- Theory

"Real World" Considerations

- Keep it short and simple
- Rapidly reconfigurable event sets
- Useful to structure discussion
- Useful as an aide memoire

SLIDE 7: DEVISING THE CHECKLIST

In addition to the theoretical considerations of behaviours and principles, we had to take into account the practical setting in which the training takes place and our objectives.

- During the interviews instructors stressed how busy they were during the SPOT and the need for any tool to be short and simple. The group is tired after a four hour session and only has a limited amount of concentration left - a tool should not be too long.
- From our perspective, we wanted a tool that would assist the instructor to structure discussion rather than be prescriptive to allow for the individual differences between crews.
- Many airlines are moving towards compiling SPOTs from a series of rapidly reconfigurable event sets, meaning the tool would have a longer usefulness if the items could be clearly divided amongst the events.

Example Items From Checklist

- Aware of traffic (SA)
- Monitor altimeter (SA)
- Note cues to catch altitude capture failure (SA)
- Pilot levels manually prior to reaching 12,000 feet (DM)
- Set up autopilot to test (P)

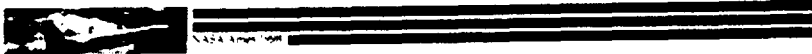
SLIDE 8: EXAMPLE LIST OF ITEMS

From our approach, we developed a tool which contains 30 items under the four event sets.

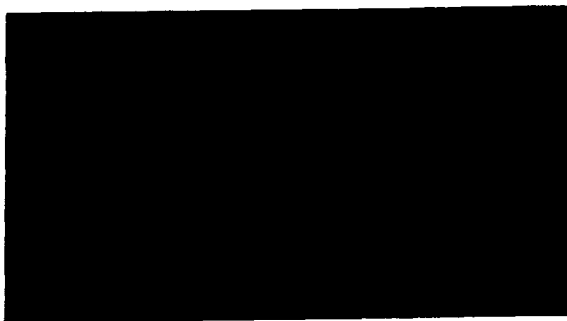
This example shows the behaviours we selected for the failed altitude capture event. In addition to the five items we listed the CRM behaviour that these actions reflected. The intention was that instructors would be able to raise these behaviours and discuss with the crew how they reflected that the crew had, or did not have, SA, or a plan at that point.

What They Discussed

- 15 audio tapes of debriefings
- Compared to debriefing tool
- 4 events discussed



Events Most Frequently Discussed



SLIDE 9: WHAT THEY TALKED ABOUT

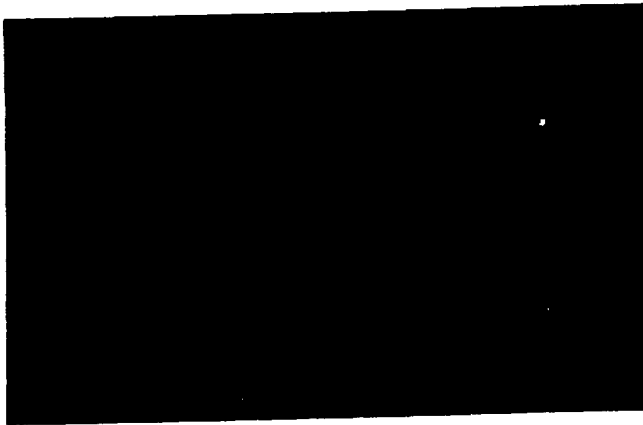
Due to some unfortunate circumstances, we were unable to test the use of the tool in the debriefing sessions. However, we were able to collect 15 audio tapes of debriefing sessions. We content analyzed these sessions and compared the debriefing themes with the tool items to assess whether they *would have* provided a useful structure for the discussions.

On average instructors discussed around four of the events from the SPOT in their debriefings. Among the most frequently discussed, were two of the four events we had selected: the failure of altitude capture and the smoke in the cabin - both of which were talked about in around 9 out of 15 debriefs or 60% of the time. The runway changes and preflight brief were discussed less often.

The most popular topics for discussion were the distractions on the climb - such as traffic; the way the crews used the automation, to their advantage or disadvantage; the way they divided their workload and how hurried rushed or busy they felt.

All of the debriefs included mention of SA, although the depth of discussion varied markedly - the number of mentions varying between 2 and 10. Of the remaining CRM skills, workload management was discussed most often, being mentioned in 13 of the 15 debriefs - that's 87% - and just under 3 times in a session on average.

Most Frequently Covered Tool Items



SLIDE 10: VERIFYING THE BEHAVIOURS

Against this background view of the discussion we compared the items on the tool to see whether they would have been relevant to mention. 21 out of the 30 items were covered in at least one of the discussions, with the most often discussed behaviour being "monitoring the altimeter" in the altitude capture failure - discussed in 9 out of 15 or 60% of the debriefs. Another frequently discussed item is "deciding the level of automation to use" during the smoke incident - discussed in 8 out of 15 or 53% of the debriefs.

A distinction we had to make when looking at whether the tool could have been used in the debriefs was between the instructors mentioning an event versus discussing the event in depth. Whilst altitude capture was mentioned the most often in debriefs - by 14 / 15 or 93% of instructors, on average they only talked about one or two of the items (ave 1.66) when they did. The smoke event, as a contrast, was discussed by fewer instructors - by 11/15 or 79%, but they covered the event in more depth, discussing around three of the items - on average 2.66.

What we studied here is the unknowing coverage of the tool items with respect to the themes that were discussed, to assess whether the tool would have been any use to the instructor. Our conclusions therefore are somewhat speculative but what they did do was provide us with a methodology and a way forward for our continuing study this year.

Conclusions

- 30 items is too many
- Important \neq discussed
- Link SA to actions



NASA Ames 1998

SLIDE 11: CONCLUSIONS

It seems that even 30 items spread over four events is still too many - instructors can only make a limited number of points in the time and crew attention span that they have available. The tool needed to have fewer items - an upper limit of around 20 rather than 30.

It seems that our focus on the DFW runway change & preflight events were not appropriate, despite instructors rating these as important SA events. We learnt that some of the events that are important are generally handled well by the crews and therefore cause little discussion when there are other less certain events to debate.

Despite citing certain events as important, the instructors do not always discuss them. In particular, the preflight brief gets far less discussion time than the instructors' importance rating would suggest it should have. This may be because the crews are not really 'doing' anything but are thinking, and instructors find it hard to make the connection between SA as reflected in crew discussion versus physical actions where the connection can be more easily described.

We concluded that in this respect the tool would not have assisted the instructor. Whilst it identified the behaviours that could be connected with SA and other CRM skills, and thus sifted out a myriad of other behaviors which could be discussed and provided more of a focus on SA, it did not help the instructor make the connection by providing the link. For the next tool, which is now in development, we need to provide instructors with that explicit SA connection between the selected behaviour and the CRM skill. For example, the behaviour "noting the cues that the altitude is not going to capture" involves the monitoring component of SA. If a crew notices these cues they will be able to act before the capture fails and thus save themselves the added workload of trying to regain their altitude.